Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Navy											Date: February 2016	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603563N / *Ship Concept Advanced Design*							
COST ($ in Millions)	**Prior Years**	**FY 2015**	**FY 2016**	**FY 2017 Base**	**FY 2017 OCO**	**FY 2017 Total**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**	**Cost To Complete**	**Total Cost**
Total Program Element	162.324	17.831	10.459	14.590	-	14.590	17.274	12.067	10.914	10.555	Continuing	Continuing
2196: *Design, Tools, Plans and Concepts*	1.482	0.430	0.443	0.432	-	0.432	0.452	0.462	0.474	0.484	Continuing	Continuing
3161: *NAVSEA Tech Authority*	160.842	11.808	10.016	9.947	-	9.947	10.355	5.242	4.405	3.911	Continuing	Continuing
3376: *Strategic Sealift*	0.000	5.593	0.000	4.211	-	4.211	6.467	6.363	6.035	6.160	Continuing	Continuing

A. Mission Description and Budget Item Justification

Explore alternative surface and expeditionary ship force structures (encompassing amphibious warfare), advanced surface ship and unmanned surface vehicles concepts and potential technologies for these force structures and advanced concepts in support of pre-acquisition mission needs analysis, mission area analysis, and planning. The objective is a more affordable, mission capable surface ship force including increased ship production capability; ships with reduced manning, reduced operating and support costs, and greater utilization of the latest technology. The program directly supports the Navy Shipbuilding Plan with state-of-the-art design tools and methods for surface ship force structure studies, ship & unmanned vehicle concept studies, and advanced design concept studies for the ships that may become part of the shipbuilding plan.

Project 2196 - This project supports the next step in the development of a transformed naval force by accomplishing pre milestone A (especially pre-concept) decision efforts for all potential surface ships. These efforts are the required first step in the definition and integration of total ship systems, including combat systems, weapons systems and Hull, Mechanical and Electrical (HM&E) systems. This project funds concept development engineering, mission effectiveness analysis, and other analyses for formulation of future surface ship force structure along with development of the tools to accomplish these efforts. Efforts include advanced ship concept studies, ship and ship systems technology assessments, and the development and upgrade of ship concept design and engineering tools, methods and criteria.

Project 3161 - This project is the only R&D effort (Government and commercial) that provides a coordinated, collaborative approach to the development of cross platform naval ship and weapon system design, as well as engineering capabilities in the areas of design tools, criteria and methods. This project funds a prioritized portfolio of time-sensitive initiatives through integrated efforts in Cross Platform Systems Development (CPSD), supporting Technical Authority through the development of support elements meeting relevant operational needs of the warfare community. The areas of exploration for CPSD include surface ship concept advanced development, next generation unmanned surface vehicle, high speed ships, tool integration and technical data exchange, cybersecurity, embedded interoperability engineering, and mission capability systems engineering. The research products developed by this project directly support and influence both immediate fleet requirements and future acquisition programs by providing a range of technically acceptable alternatives and evaluation of emerging technologies. While these prototypes, standards/specs, tools and processes and other efforts support concept exploration and mission needs assessment for potential future ship acquisition programs, they are not direct efforts for specific, authorized shipbuilding programs. Products from this project transition directly to early-stage ship design for Ship Preliminary Design and Feasibility Studies and other Program Executive Office (PEO) ship design programs.

Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Navy	Date: February 2016
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603563N *I Ship Concept Advanced Design*

Tasks within this project continue to directly support interoperability testing and certification for Littoral Combat Ship (LCS) and other platforms in deploying battle groups, development and certification of Operator Guidance tools for surface combatants (CG 47, DDG 51, DDG 1000), Total Ownership Cost (TOC) pilot programs, future flexible and modular warship analyses, and development of specifications and processes to reduce production costs of platforms.

Tasks within this project continue to directly support the Test and Evaluation Master Plan (TEMP) execution for multiple ship classes including, LCS, JHSV, and DDG 1000 reducing Live Fire Test and Evaluation (LFT&E) costs, further validate hydrodynamic simulation tool supporting DDG 1000 Hull Form Plan (HFP), increase technology readiness level for aluminum combatants, develop tools to execute the CG 47 Cracking Task Force recommendations. This project supports NAVSEA's core mission and improves performance at reduced cost for current and future naval platforms.

Project 3376 - Strategic Sealift Research and Development - Develops new concepts and technologies which can be applied to or will enable future strategic sealift, and Seabasing systems. The technologies include ship configuration concepts, equipment to increase cargo handling and cargo loading/unloading rates (including commercial and merchant ship systems), improved man/machine interfaces, improved structural configurations and materials, and Logistics-Over-the-Shore (LOTS) equipment and system improvements. FY2016 and prior years (FY2014 and earlier) efforts were funded under NDSF BA 04 Project 3116 Strategic Sealift Research and Development.

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	17.864	11.888	10.445	-	10.445
Current President's Budget	17.831	10.459	14.590	-	14.590
Total Adjustments	-0.033	-1.429	4.145	-	4.145
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-1.429			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.033	0.000			
• Program Adjustments	0.000	0.000	4.116	-	4.116
• Rate/Misc Adjustments	0.000	0.000	0.029	-	0.029

Change Summary Explanation

The FY 2017 funding request was reduced by $2.638 million to account for the availability of prior years execution balance.

Decrease in Ship Concept Advance Design RDTEN by $0.559 million as required for the Department of the Navy to comply with the Bipartisan Budget Act of 2015.

Programmatic:

Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Navy	Date: February 2016
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603563N *I Ship Concept Advanced Design*

Project 3161: The Cross Platform Systems Development Program (CPSD) was adjusted based on reduced level of effort.

Financial: Beginning in FY 2017, efforts previously financed under the National Sealift Defense Fund (NDSF) BA 04, Project 3116 (Strategic Sealift Research and Development) are financed under this program element. FY 2016 NDSF BA 04 Project 3116 amount: $5.502M. This project is not a new start.

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603563N / *Ship Concept Advanced Design*	Project (Number/Name) 2196 / *Design, Tools, Plans and Concepts*	

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
2196: *Design, Tools, Plans and Concepts*	1.482	0.430	0.443	0.432	-	0.432	0.452	0.462	0.474	0.484	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project provides the foundation for an affordable and mission capable surface ship force. It also supports the next step in the development of a transformed naval force by accomplishing the pre-milestone A (especially pre-concept decision) efforts for all potential surface ships. These efforts are the required first step in the integration of total ship systems, including combat systems, weapons systems and Hull, Mechanical and Electrical (HM&E) systems. Inadequate early planning and ship concept formulation can result in down-stream design, construction and operational problems. A more subtle and severely negative impact of neglecting this early effort is that the "best" concepts and technologies may never even be considered and the greatest potential ship design advances never realized. Designs and technologies must consider how to meet the threat. This project supports this requirement.

This project funds concept development engineering, mission effectiveness analysis, and other analyses for formulation of future surface ship force structure along with development of the tools to accomplish these efforts. Advanced ship concept studies, ship and ship systems technology assessments, and the development and upgrade of ship concept design and engineering tools, methods, and criteria are also funded in this project.

This project:

(1) Develops alternative surface ship force structure concepts including the ships and unmanned vehicles.
(2) Evaluates the mission capability effectiveness and costs for these alternative surface fleet architectures.
(3) Performs fleet war fighting/mission effectiveness assessment studies.
(4) Identifies future surface ship requirements and characteristics necessary to meet future threats and support mission needs.
(5) Investigates new affordable ship concepts and evaluates technologies necessary to support these concepts.
(6) Provides design methods and automated design tools to develop and evaluate ship concepts.
(7) Supports development of Initial Capabilities Documents (ICD) and analogous early requirements documents for future ships.

These efforts are done to support analysis; mission needs development and technology assessment in support of future fleet concepts and potential ship acquisition programs. These efforts are fundamental to the Navy's formulation of the future fleet requirements.

These efforts supports and maintains naval ship design and engineering capabilities in the design phase of developing concept design tools, criteria and methods.

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Title: Ship Concepts and Mission Need Analysis	0.430	0.443	0.432	0.000	0.432
Articles:	-	-	-	-	-
Description: Develop ship concepts and perform analysis for potential ships and Force Architecture 5-10 years out in shipbuilding plan. ***FY 2015 Accomplishments:*** Developed concepts of integrating unmanned vehicles aboard surface ships. Refined cost analyses of surface ship design and construction. Furthered improvements of surface ship design tools. Continued concept development efforts to explore flexible, modular surface combatants. ***FY 2016 Plans:*** Continue improving tools that relate ship costs to ship capabilities. Explore concepts of surface ships that can deploy swarms of unmanned autonomous systems, and react to such swarms deployed by the enemy. Analyze the impact of distributed high energy storage systems on ship design. ***FY 2017 Base Plans:*** Continue to participate in efforts to improve understanding of performance and mobility of high speed ships. ***FY 2017 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.430	0.443	0.432	0.000	0.432

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
• RDTEN/0204202N: *DDG-1000*	196.987	103.179	45.642	-	45.642	19.279	15.617	19.721	0.000	0.000	1,538.428
• RDTEN/0603512N: *Carrier Systems Development*	5.954	8.348	7.605	-	7.605	9.283	5.894	5.752	5.874	Continuing	Continuing
• RDTEN/0603564N: *Ship Preliminary Design/Feasibility*	8.007	3.332	15.805	-	15.805	11.645	8.863	9.076	9.283	Continuing	Continuing
• RDTEN/0604567N: *Ship Contract Design/Live Fire T&E*	39.459	38.925	65.002	-	65.002	67.591	69.901	53.871	56.267	Continuing	Continuing
• RDTEN/0603582N: *Combat System Integration*	20.741	32.561	23.530	-	23.530	22.055	19.473	17.890	17.602	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

This is a non-acquisition program that develops, evaluates, and validates early stages of total ship concepts and technologies in support of SCN planning and potential future ship acquisition programs. This program also supports development, demonstration, evaluation, and validation of engineering tools, methods, and criteria for those concept designs and assessments.

E. Performance Metrics

Quarterly Program Reviews

Monthly Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	C/CPFF	Various Contractors : Various	0.490	0.094	Feb 2015	0.096	Apr 2016	0.097	Feb 2017	-		0.097	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC : Various	0.631	0.275	Nov 2014	0.277	Nov 2015	0.262	Nov 2016	-		0.262	Continuing	Continuing	Continuing
Engineering Development	C/CPFF	Various Contractors : Various	0.171	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Engineering Development	WR	NSWC : Various	0.136	0.061	Nov 2014	0.070	Nov 2015	0.073	Nov 2016	-		0.073	Continuing	Continuing	Continuing
Demonstration & Evaluation	C/CPFF	Various Contractors : Various	0.029	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Test & Evaluation	C/CPFF	Various Contractors : Various	0.020	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	1.477	0.430		0.443		0.432		-		0.432	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Allot	NAVSEA HQ : Washington, DC	0.005	0.000		0.000		0.000		-		0.000	0.000	0.005	-
		Subtotal	0.005	0.000		0.000		0.000		-		0.000	0.000	0.005	-

	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1.482	0.430		0.443		0.432		-		0.432	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

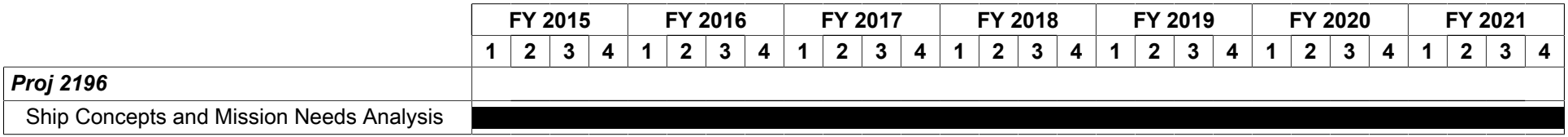


Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2196				
Ship Concepts and Mission Needs Analysis	1	2015	4	2021

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603563N / *Ship Concept Advanced Design*	Project (Number/Name) 3161 / *NAVSEA Tech Authority*	

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
3161: *NAVSEA Tech Authority*	160.842	11.808	10.016	9.947	-	9.947	10.355	5.242	4.405	3.911	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project has been established to support NAVSEA Technical Authority through coordinated, collaborative, cross-platform systems development in advanced capabilities across business lines through development of processes, procedures, and tools necessary to develop future surface ship force structures; advanced surface ship and unmanned surface vehicle concepts; interoperability; and development of systems level engineering criteria and options to support the current fleet, future pre-acquisition and advanced concepts mission needs analysis, SCN, and R&D planning. The objective is the coordination of design and development efforts for cross-platform applicability to result in more affordable, mission-capable, and interoperable surface ship forces including ships that are less expensive to build and operate with reduced manning, reduced support costs, and greater utilization of emerging technology.

NAVSEA Tech Authority efforts under Project 3161, known as the Cross Platform Systems Development (CPSD) Program transition directly to early-stage ship design for Ship Preliminary Design and Feasibility Studies and other Program Executive Office (PEO) ship design programs. While these efforts support concept exploration and mission needs assessment for potential future ship acquisition programs, they also develop cross-program technology solutions and associated technical authority products. They are not direct efforts for specific, authorized shipbuilding programs. This project is the only R&D effort (Government or commercial) that provides a coordinated, collaborative approach to the development of: cross-platform naval ship and weapon system design, as well as engineering capabilities in the areas of design tools, criteria, and methods. This project also provides innovative solutions for current Fleet issues involving Technical Authority, such as interoperability issues with new systems or platforms, or broad technology insertion topics.

The CPSD program is comprised of the following functional areas:

CPSD 1.0 - Platform Concept Advanced
CPSD 2.0 - Platform Design and Certification Tools/Engineering and Tech Data Exchange Development
CPSD 3.0 - Ship Systems Engineering/Modular Ship Systems Development.
CPSD 5.0 - High Speed Ships and Craft Engineering
CPSD 6.0 - Alternate Power Systems Engineering
CPSD 8.0 - Embedded Interoperability Engineering
CPSD 9.0 - Mission Capability Systems Engineering
CPSD 13.0 - Cybersecurity
CPSD 14.0 - Future Surface Combatant Study

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Title: Platform Concept Advanced Development (CPSD 1.0)	0.878	0.420	0.159	0.000	0.159
Articles:	-	-	-	-	-
Description: This effort directly supports the Navy's ability to understand risk and associated cost of surface and expeditionary warfare assets; unmanned surface vehicle (USV) design and analysis. ***FY 2015 Accomplishments:*** Explored concepts for flexible and modular surface ships that met Long Range Shipbuilding Strategy capability goals at reduced cost. Developed concepts for surface ship designs that optimized the use of unmanned vehicles. Investigated the feasibility of using mission modules across other surface ship platforms. ***FY 2016 Plans:*** Provide guidance to initial adopters of radically new manufacturing technology. ***FY 2017 Base Plans:*** Support the execution of cross platform aspects and specification development for modular future surface combatants. ***FY 2017 OCO Plans:*** N/A					
Title: Platform Design and Certification Tools/Engineering and Tech Data Exchange (CPSD 2.0)	0.898	0.431	0.244	0.000	0.244
Articles:	-	-	-	-	-
Description: This effort supports the development of validation tools to certify the safety and mission capability of platform concepts and subsequently ships and submarines; establishes the integrated NAVSEA suite. This effort advances platform design methods, design validation tools, cost tools, manpower tools, and tools to aid in rapid total platform definition. ***FY 2015 Accomplishments:*** Developed software suite tool to assess the performance of a hull array sonar after loss of one or more hydrophones. Refined ship design tools to better incorporate combat system capabilities. ***FY 2016 Plans:*** Validate the use of modeling and simulation to test hardware too big and powerful to safely test by conventional physical methods. ***FY 2017 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Continue development of fleet architecture and force shaping tools to incorporate the future introduction of unmanned systems in large numbers. ***FY 2017 OCO Plans:*** N/A					
Title: Ship Systems Engineering /Modular Ship Systems Development (CPSD 3.0) ***Articles:*** ***Description:*** This effort supports Ship system development with a focus on technology transition, modularity, ship system technology integration, and design standards for new ship classes for pre-Analysis of Alternatives (AoA) studies and ongoing ship modernization. ***FY 2015 Accomplishments:*** Explored cross platform approaches to solving corrosion problems, techniques and applications not being developed by other programs. Developed the use of composite materials for use in more shipboard applications. Researched methods of extending propulsion shaft life through improved shaft coatings and couplings. ***FY 2016 Plans:*** Perform root cause analysis of aluminum plate cracking. Perform Sea Trial of insulation seam tape that replaces costly current process using hazardous materials. Determine if cold spray repair of aluminum will maintain waterfastness. ***FY 2017 Base Plans:*** Continue to analyze the logistical and engineering aspects of the application of 3D modeling and printing technology. Continue assessment of current state of technology of robotic methods of cleaning, welding, painting, and inspecting shipboard tank and void spaces. ***FY 2017 OCO Plans:*** N/A	1.596 -	1.138 -	0.252 -	0.000 -	0.252 -
Title: High Speed Ships and Craft Engineering (CPSD 5.0) ***Articles:*** ***Description:*** This effort supports the development of concepts for future high speed ships that promise improved mission effectiveness in mobility, survivability and warfare mission areas. ***FY 2015 Accomplishments:***	4.507 -	2.723 -	2.204 -	0.000 -	2.204 -

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Continued development of analytical tools for the generation of surface ship Operator Guidance products. Completed and delivered surface ship Heavy Weather Guidance (HWG). Continued Verification, Validation, and Accreditation (VV&A) of the simulation tool for characterizing ship motions in environments not within ability to test. Continued simulation runs of ship motions in prescribed environmental conditions required to develop the surface ship Operator Guidance. Continued to support the integration of capability on the ship and associated training guidance for the ship's crew. Participated in efforts to improve understanding of hydrodynamic performance of multi-hull ships. ***FY 2016 Plans:*** Continue the development of analytical tools for the generation of surface ship Operator Guidance products. Complete VV&A of the simulation tool for characterizing ship motions in environments not within ability to test. Continue simulation runs of ship motions in prescribed environmental conditions required to develop the surface ship Operator Guidance. Continue to support the integration of the Operator Guidance capability on the ship and associated training guidance for the ship's crew. Support the survivability of testing and analysis. ***FY 2017 Base Plans:*** Continue the development of analytical tools for the generation of surface ship Operator Guidance products. Complete and deliver an update of surface ship HWG. Complete simulation runs of ship motions in prescribed environmental conditions required to develop the surface ship Operator Guidance. Continue to support the integration of the Operator Guidance capability on the ship and associated training guidance for the ship's crew. Operator Guidance development and HWG updates are expected to extend into FY 2018 - FY 2020. ***FY 2017 OCO Plans:*** N/A					
Title: Alternative Power Systems Engineering (CPSD 6.0) ***Articles:*** ***Description:*** This effort investigates concepts for ships with alternative power/propulsion systems evaluating effectiveness in mobility, survivability, and in traditional and evolving warfare mission areas including operations in polar regions. ***FY 2015 Accomplishments:*** Evaluated pod propulsor for future ship concept design. ***FY 2016 Plans:***	0.444 -	0.000 -	0.158 -	0.000 -	0.158 -

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
N/A ***FY 2017 Base Plans:*** Evaluate energy harvesting technology for mobility and primary mission systems. Continue to investigate concepts supporting Forward Deployed Energy (FDE) techniques for refueling unmanned vehicles. ***FY 2017 OCO Plans:*** N/A					
Title: Embedded Interoperability (I/O) Engineering (CPSD 8.0)	0.337	0.304	0.084	0.000	0.084
Articles:	-	-	-	-	-
Description: This effort establishes and executes a dedicated process for evaluating the interoperability performance of warfare systems early in the acquisition cycle, prior to certification. Embedded I/O ensures that fewer mission critical system failures degrade the ultimately fielded war fighting capability. Focus on emerging Open Architecture warfare systems, including LCS Class. ***FY 2015 Accomplishments:*** Explored methods of further reducing costs of achieving certified interoperable systems. Researched ways to standardize and reduce the number of surface electro-optic and infrared systems and their interfaces. Further improved the generation of strike group interoperability and the generation of Capabilities and Limitations documents. ***FY 2016 Plans:*** Investigate and promote interoperability between Electro Optic and Infrared (EO/IR) Systems in fleet. ***FY 2017 Base Plans:*** Continue exploring methods of further reducing costs of achieving certified interoperable systems. Continue exploring ways to standardize and reduce the number of surface electro-optic and infrared systems and their interfaces. ***FY 2017 OCO Plans:*** N/A					
Title: Mission Capability Systems Engineering (CPSD 9.0)	3.148	0.000	0.538	0.000	0.538
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Description: This effort supports the development of force-level systems engineering criteria and guidance at the Systems of Systems (SoS) and Family of Systems (FoS) level. This effort allows for the enhanced warfighter and system performance with reduced personnel costs with project cost savings. ***FY 2015 Accomplishments:*** Conducted a Capabilities Based Assessment to address future surface combatant force level operational and engineering requirements determination. ***FY 2016 Plans:*** N/A ***FY 2017 Base Plans:*** Study the concepts of modularity and open architecture in combat systems and propose parallel concepts for hull, mechanical, and electrical systems. ***FY 2017 OCO Plans:*** N/A					
Title: Cybersecurity Technologies (CPSD 13.0) ***Articles:*** ***Description:*** This supports the development and testing of cybersecurity solutions for shipboard HM&E Machinery Control Systems (MCS), Navigation Systems, Combat Systems, and other shipboard control systems. It also supports the development of specifications and standards for the cybersecurity of all Navy Control Systems (NCS) ***FY 2015 Accomplishments:*** N/A ***FY 2016 Plans:*** Research and develop various cross-platform cybersecurity solutions including but not limited to: Cyber Security Optimized Network Design, Secure System Startup methodologies, Automated Removable Media Control Techniques, and Operational indifference to malicious intent. Research new techniques or methodologies to ensure secure network traffic (authenticated and encrypted)for Navy Control Systems (NCS). Conduct test and	0.000 -	5.000 -	4.308 -	0.000 -	4.308 -

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
evaluation of cybersecurity technologies in an operational environment. Continue development of specifications and standards for cybersecurity of NCS. ***FY 2017 Base Plans:*** Continue research and develop various cross-platform cybersecurity solutions including but not limited to: Cyber Security Optimized Network Design, Secure System Startup methodologies, Automated Removable Media Control Techniques, and Operational indifference to malicious intent. Research new techniques or methodologies to ensure secure network traffic (authenticated and encrypted)for Navy Control Systems (NCS). Conduct test and evaluation of cybersecurity technologies in an operational environment. Continue development of specifications and standards for cybersecurity of NCS. ***FY 2017 OCO Plans:*** N/A					
Title: Future Surface Combatant Study (CPSD 14.0) ***Articles:*** ***Description:*** This effort will lay the analytic foundation for the development of the Future Surface Combatant post Capabilities Based Assessment. Ships produced from this effort will fill critical gaps in the fleet in the 2030 timeframe created by the decommissioning of CG 47, DDG 51, and LCS 1/2 ships. ***FY 2015 Accomplishments:*** N/A ***FY 2016 Plans:*** N/A ***FY 2017 Base Plans:*** Conduct study to lay analytic foundation to support the development Future Surface Combatants post Capabilities Based Assessment (CBA). ***FY 2017 OCO Plans:*** N/A	0.000 -	0.000 -	2.000 -	0.000 -	2.000 -
Accomplishments/Planned Programs Subtotals	11.808	10.016	9.947	0.000	9.947

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*	

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
• RDTEN/0204202N: *DDG-1000*	196.987	103.179	45.642	-	45.642	19.279	15.617	19.721	0.000	0.000	1,538.428
• RDTEN/0603512N: *Carrier Systems Development*	5.954	8.348	7.605	-	7.605	9.283	5.894	5.752	5.874	Continuing	Continuing
• RDTEN/0603564N: *Ship Preliminary Design/ Feasibility Studies*	8.007	3.332	15.805	-	15.805	11.645	8.863	9.076	9.283	Continuing	Continuing
• RDTEN/0604567N: *Ship Contract Design/Live Fire T&E*	39.459	38.925	65.002	-	65.002	67.591	69.901	53.871	56.267	Continuing	Continuing
• RDTEN/0603582N: *Combat System Integration*	20.741	32.561	23.530	-	23.530	22.055	19.473	17.890	17.602	Continuing	Continuing

Remarks

D. Acquisition Strategy

This is a non-acquisition program that develops, evaluates, and validates early stages of total ship concepts and technologies in support of SCN planning and potential future ship acquisition programs. This program also supports development, demonstration, evaluation, and validation of engineering tools, methods, and criteria for those concept designs and assessments. This program provides validated engineering tools, methods, and criteria for ship, and weapon system concept designs and assessments while fostering collaboration and coordination of efforts resulting in more effective use of funding.

E. Performance Metrics

Quarterly Program Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	C/CPFF	Various Contractors : Various	17.066	1.370	Feb 2015	0.475	Feb 2016	1.236	Feb 2017	-		1.236	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC, NUWC, CDSA : Various	58.470	4.359	Dec 2014	0.711	Dec 2015	0.660	Dec 2016	-		0.660	Continuing	Continuing	Continuing
Engineering Development	C/CPFF	DRS : Stevensville, MD	3.213	0.036	Dec 2014	0.421	Dec 2015	0.329	Dec 2016	-		0.329	Continuing	Continuing	Continuing
Engineering Development	WR	NSWC, NUWC : Various	50.015	3.450	Dec 2014	2.952	Dec 2015	2.204	Dec 2016	-		2.204	Continuing	Continuing	Continuing
Demonstration & Evaluation	WR	NSWC : Various	18.776	1.268	Nov 2014	0.150	Nov 2015	0.235	Dec 2016	-		0.235	Continuing	Continuing	Continuing
Demonstration & Evaluation	WR	SPAWAR : Various	1.922	0.000	Mar 2015	0.000		0.161	Jan 2017	-		0.161	Continuing	Continuing	Continuing
Test and Evaluation	WR	NSWC : Various	10.605	1.305	Nov 2014	0.147	Nov 2015	0.815	Nov 2016	-		0.815	Continuing	Continuing	Continuing
Cybersecurity Technologies	WR	NSWC : Various	0.000	0.000		2.000	Dec 2015	1.723	Jan 2017	-		1.723	0.000	3.723	-
Test and Evaluation	C/CPFF	Various Contracts : Various	0.000	0.000		0.150	Feb 2016	0.000		-		0.000	0.000	0.150	-
Cybersecurity Technologies	C/CPFF	Various Contracts : Various	0.000	0.000		3.000	Dec 2015	2.584	Jan 2017	-		2.584	0.000	5.584	-
		Subtotal	160.067	11.788		10.006		9.947		-		9.947	-	-	-

Management Services ($ in Millions)

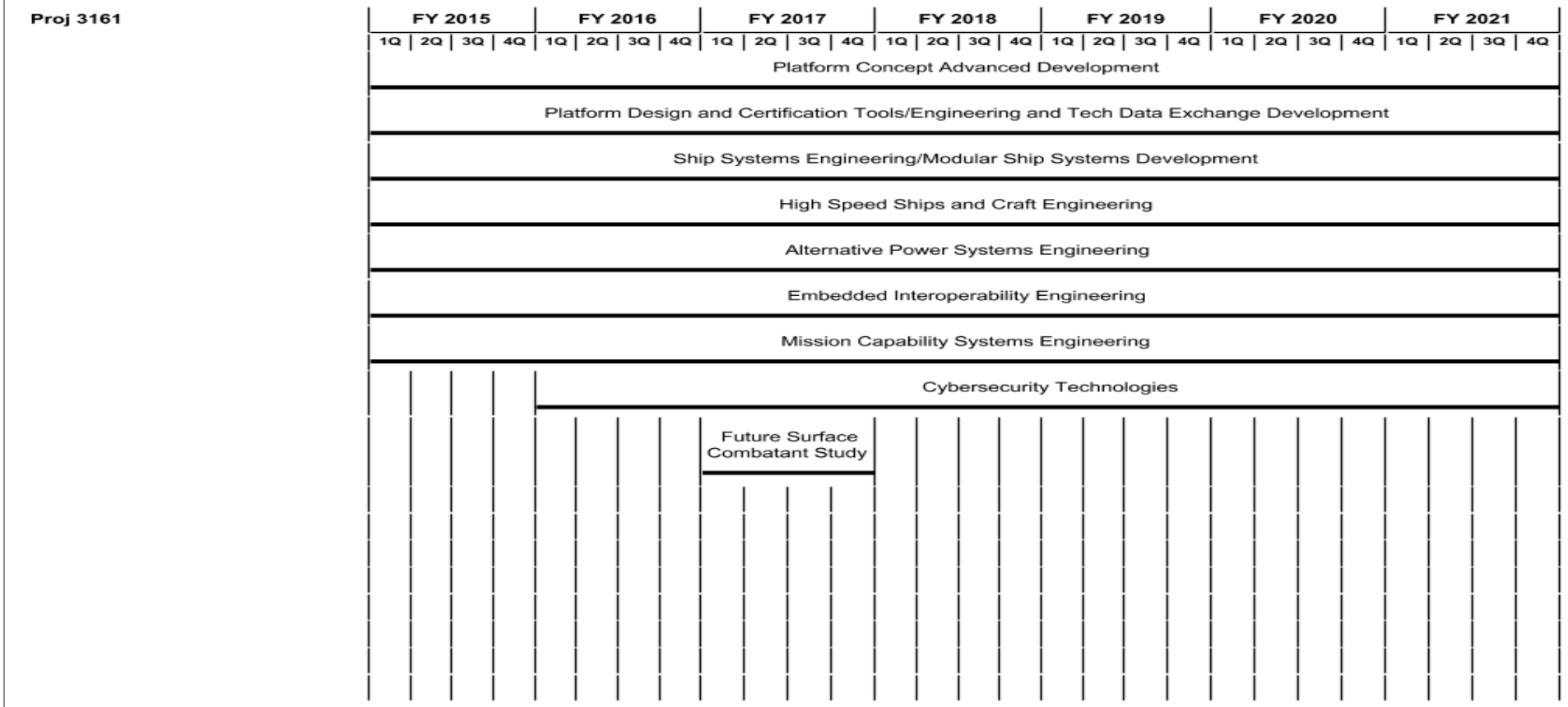
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PM/Travel	Allot	NAVSEA HQ : Washington, DC	0.630	0.020	Oct 2014	0.010	Oct 2015	0.000		-		0.000	Continuing	Continuing	Continuing
DAWDF	Various	Not Specified : Not Specified	0.145	0.000		0.000		0.000		-		0.000	0.000	0.145	-
		Subtotal	0.775	0.020		0.010		0.000		-		0.000	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603563N / *Ship Concept Advanced Design*	Project (Number/Name) 3161 / *NAVSEA Tech Authority*	

	Prior Years	FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	160.842	11.808		10.016		9.947		-		9.947	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*



2017PB - 0603563N - 3161

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3161				
Platform Concept Advanced Development	1	2015	4	2021
Platform Design and Certification Tools/Engineering and Tech Data Exchange Development	1	2015	4	2021
Ship Systems Engineering/Modular Ship Systems Development (PNA)	1	2015	4	2021
High Speed Ships and Craft Engineering (HFP)	1	2015	4	2021
Alternative Power Systems Engineering	1	2015	4	2021
Embedded Interoperability Engineering	1	2015	4	2021
Mission Capability Systems Engineering	1	2015	4	2021
Cybersecurity Technologies	1	2016	4	2021
Future Surface Combatant Study	1	2017	4	2017

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603563N / *Ship Concept Advanced Design*	Project (Number/Name) 3376 / *Strategic Sealift*	

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
3376: *Strategic Sealift*	0.000	5.593	0.000	4.211	-	4.211	6.467	6.363	6.035	6.160	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 3376 - Strategic Sealift Research and Development - Develops new concepts and technologies which can be applied to or will enable future strategic sealift, and Seabasing systems. The technologies include ship configuration concepts, equipment to increase cargo handling and cargo loading/unloading rates (including commercial and merchant ship systems), improved man/machine interfaces, improved structural configurations and materials, and Logistics-Over-the-Shore (LOTS) equipment and system improvements. Beginning in FY 2017, efforts previously financed under the National Sealift Defense Fund (NDSF) BA 04, Project 3116 (Strategic Sealift Research and Development) are financed under this program element. FY 2016 NDSF BA 04 Project 3116 amount: $5.502M. This project is not a new start.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Title: Shipboard Crane Systems/Shipboard Cargo Systems	1.250	0.000	1.000	0.000	1.000
Articles:	-	-	-	-	-
FY 2015 Accomplishments: FY15 - Continued investigation and demonstration of shipboard crane/cargo systems improvements.					
FY 2016 Plans: N/A					
FY 2017 Base Plans: FY17 - Continue investigation and demonstration of shipboard crane/cargo systems improvements. Continue FY16 demonstration of UUV/USV handling interface with Sealift ships.					
FY 2017 OCO Plans: N/A					
Title: Sealift Concept Development	1.283	0.000	1.700	0.000	1.700
Articles:	-	-	-	-	-
FY 2015 Accomplishments: FY15 - Continued providing Advanced Planning, Sealift Research, and Technology development and program guidance.					
FY 2016 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3376 / *Strategic Sealift*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
N/A ***FY 2017 Base Plans:*** FY17 - Continue providing Advanced Planning, Sealift Research, and Technology development and program guidance. Continue demonstrations of Adaptive Force Packages with Sealift ships. ***FY 2017 OCO Plans:*** N/A					
Title: Lighter/HSV Seabase to Shore Cargo Transfer	3.060	0.000	1.511	0.000	1.511
Articles:	-	-	-	-	-
FY 2015 Accomplishments: FY15 - Continued development and demonstration of at-sea vehicle transfer capability. ***FY 2016 Plans:*** N/A ***FY 2017 Base Plans:*** FY17 - Continue development and demonstration of at-sea vehicle transfer capability. ***FY 2017 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	5.593	0.000	4.211	0.000	4.211

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
• NDSF/3116: *Strategic Sealift Research and Development*	0.000	5.502	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	58.831

Remarks

D. Acquisition Strategy

Not applicable for SEALIFT R&D efforts.

E. Performance Metrics

Annual Program Review.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3376 / *Strategic Sealift*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Sealift Concept Development	WR	Various Contractors : Various	0.000	1.283	Jan 2015	0.000		1.700	Jan 2017	-		1.700	Continuing	Continuing	Continuing
Shipboard Crane Systems	WR	Various Contractors : Various	0.000	1.250	Jan 2015	0.000		1.000	Jan 2017	-		1.000	Continuing	Continuing	Continuing
Lighter/HSV Seabase to Shore Cargo Transfer	WR	Various Contractors : Various	0.000	3.060	Jan 2015	0.000		1.511	Jan 2017	-		1.511	Continuing	Continuing	Continuing
		Subtotal	0.000	5.593		0.000		4.211		-		4.211	-	-	-

Remarks

1. FY 2016, and prior years (FY14 and earlier) were funded under NDSF BA 04 Project 3116 Strategic Sealift Research and Development.

2. Award dates reflect initial date of incremental funding execution.

	Prior Years	FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	5.593		0.000		4.211		-		4.211	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3376 / *Strategic Sealift*

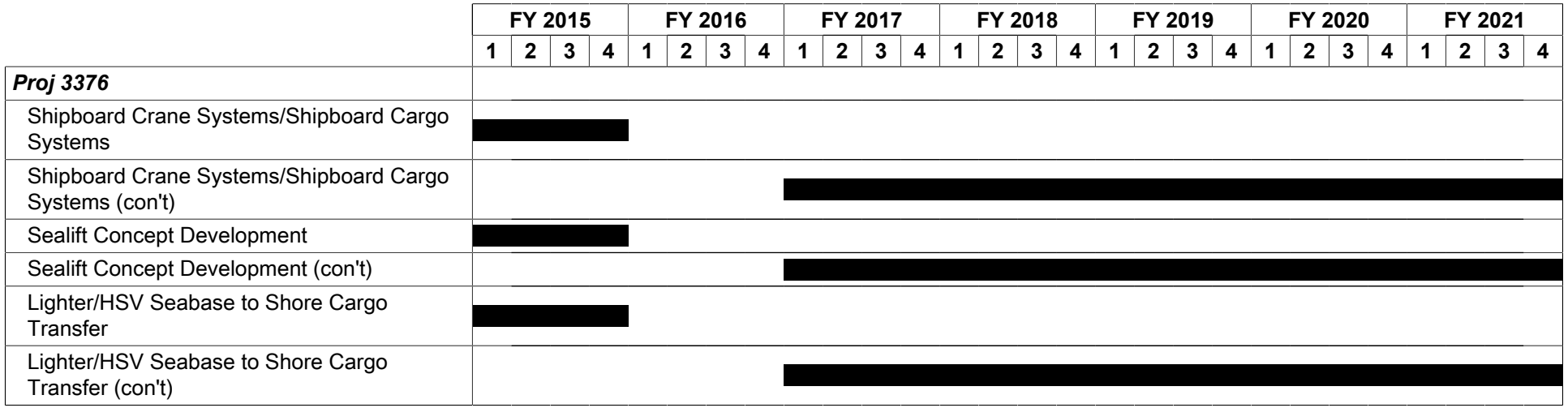


Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3376 / *Strategic Sealift*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3376				
Shipboard Crane Systems/Shipboard Cargo Systems	1	2015	4	2015
Shipboard Crane Systems/Shipboard Cargo Systems (con't)	1	2017	4	2021
Sealift Concept Development	1	2015	4	2015
Sealift Concept Development (con't)	1	2017	4	2021
Lighter/HSV Seabase to Shore Cargo Transfer	1	2015	4	2015
Lighter/HSV Seabase to Shore Cargo Transfer (con't)	1	2017	4	2021